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EXAMINER	
VERDERAME, ANNA L	
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	**Application No.**	**Applicant(s)**
	10/804,098	YAMAMOTO ET AL.
	Examiner	**Art Unit**
	Anna L. Verderame	1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 19 March 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) 1-7 and 11-20 is/are rejected.

7)☒ Claim(s) 8 and 19 is/are objected to.

8)☐ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 19 March 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 19 March 2004.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-8 and 11-20, drawn to an optical recording medium and an optical recording device, classified in class 430and subclass 270.13

   II. Claims 9-10, drawn to a method of manufacturing an optical recording medium, classified in class 427, subclass 166.

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the process of making an optical recording medium, invention II, is not unique to the optical recording medium(Invention 1). An optical recording medium could be formed by an apparatus using vapor deposition rather than sputtering and/or using multiple deposition chambers rather than a single deposition chamber with multiple gas sources.

3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art

due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Melvin Kraus on December 12, 2006 a provisional election was made with traverse to prosecute the invention of an optical recording medium and an optical recording device, claims 1-8 and 11-20. Affirmation of this election must be made by applicant in replying to this Office action. Claims 9-10 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-3, 5-7, 11-14, 16-18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. JP 03-091128 in view of Rosen et al. EP 0 810 590 and Shintani et al 2003/0039200 ,Sakaue et al . '451.

Hara et al. JP-03091128 teaches the formation of an optical recording member like that in figures 1 and 2 of this application. To increase an initial reflectivity and an increase in the change of reflectivity before and after recording by forming a high-refractive index dielectric layer at the odd number layer (3) and

a low-refractive index dielectric layer at the even numbered layer (2). The high-refractive index layer 2 consists of any of ZnS, ZnSe, TiO_2,CeO_2 or HfO_2. The low refractive index films can be formed of MgF_2,CaF_3, $NaAlF_4$. These layers are laminated in 2-7 layers. The recording layer(1) is formed by using a material which is formed by using the material which is formed with recesses or holes or is changed in refractive index by radiation with the laser beam (abstract).

Rosen et al. EP 0 810 590 teaches an optical data storage disk, shown in figure 5, with multiple recording stacks 90,92 each containing a rewriteable phase-change recording layer 53, 64 respectively. A dielectric thin film 51 is deposited by sputtering on substrate 50. The dielectric acts as a protective layer so that the high temperature that the recording layer 53 experiences during recording does not deform the substrate 50. A layer of reverse writing type of reversible phase-change material is deposited by sputtering or evaporation on dielectric layer 51 to serve as the recording layer in the first stack 90. The preferred material for the phase-change layer is a GeSbTe alloy of thickness 5-50nm. This type of reverse writing reversible phase-change material is described in US patent 5,383,172 which requires the presence of a metallic heat sink layer (AlN) be provided in contact with the recording layer. An AlN layer typically has a transmissivity of less than 10% and is therefore not suitable for multiple recording layer optical disks where light transmissivity must be approximately 30%. In the present invention, one or more additional layers, such as optical interference layers 55,59 and semitransparent non-metallic heat dissipation films 57 are

deposited on the recording film. By use of optical interference effects of thin films, the transmissivity, reflectivity, and absorption of the multilayer recording stack 90 can be adjusted by varying the individual layer thicknesses. Layers 51,53,55, 57, and 59 together form an interference structure. Constructive interference occurs if the thicknesses of the layers are properly selected based on the thickness and the real part(n) of each layer's index of refraction. A large difference in the value n for the layers 51, 55, 57 and 59 relative to the index of refraction of its adjacent layer(recording layer 53) increases the interference effect for a given layer thickness and will optimize the signal contrast and the reflectivity of the recording stack 90. Optical interference films 51,55,57,59 should also have a low absorption (low imaginary part of the index of refraction, i.e., low extinction factor k) so that when the light spot is focused on the second recording layer 64, it will transmit through recording layer 51,55,57,59, with minimal absorption. Dielectric materials such as Zn and/or Cr mixed with one or more of S, Se, and Te are preferred for the optical interference films 51,55,57,59. Dielectric materials such as SiO_x, TiO_x, ZrO_x, and CuO_x, SiN, SiC, amorphous Si, or organic polymers or mixtures of different dielectrics and the like are also useable. Other suitable materials for optical interference films 51,55,57,59 are oxides, and nitrides of elements selected from the group consisting of Al, Ti, Zr, Cu, Hf, Ta, Nb, Cr, W. These materials may be in the amorphous or crystalline phase. The optical interference effects are calculated using standard thin film interference calculations as described for example in Optical properties of Thin Solid Films, O.S. Heavens, Academic Press, 1955. A solid polymeric spacer

layer 44 is adjacent to the optical interference film 59 and separates the two recording stacks 90 and 92. The second recording stack 92 comprises a rigid transmissive dielectric layer 62 sputtered or evaporated on the second recording layer 64. Recording layer 64 is deposited on another rigid dielectric layer 66 which is adjacent to a heat dissipation layer 68 deposited on substrate 56. Since stack 92 is the last recording stack in the multiple recording layer optical disk and does not have to be light transmissive, a metallic film can be used for layer 68(6/1-7/13).

In a preferred embodiment of optical disk 12, as shown in figure 5, with a laser operating at 650nm wavelength, substrates 50,56 are polycarbonate of 0.6mm thickness. First rigid dielectric layer 51 is ZnS or SiO_2 or a mixture of both with a thickness of 70-150nm. First recording layer 53 is $Ge_{11}Te_{47}Sb_{42}$ of 15nm thickness. Dielectric layer 55 is ZnS or SiO_2 , or a mixture of both, with a thickness of 10nm. Thermal dissipation layer 57 is amorphous Si of thickness 50 nm. Optical interference film 59 is Si_3N_4 of thickness 60 nm. The transmissivity of stack 90 with these layers is 31% when the recording layer 53 is in the amorphous (or unwritten) phase, and is 15% in the crystalline or written phase. The spacer layer 44 is a UV-curable, spin-coated photo-polymer of 200 microns thickness. The dielectric layer 62 for the stack 92 is ZnS or SiO_2 or a mixture of both with a thickness of 100nm. The second recording layer 64 in stack 92 is formed of conventional type of rewriteable phase-change material with a thickness of 25 nm. The second dielectric layer 66 is ZnS or SiO_2 or a combination of both having a thickness of 15nm. The metallic heat dissipation

layer 68 is Al having a thickness of 100nm. The laser light is of a shorter wavelength, to reduce spot size and thereby increase the recording density, adjustment of the thickness of the heat dissipation layer 57 and dielectric layer 59 is needed. For example, for laser light at a 500nm wavelength, the thickness of layers 57, 59 is optimally 25 nm and 65nm respectively(6/5-7/38). Layers 51,55,57, and 59 are optical interference films and should have low absorption (low imaginary part of index of refraction, i.e., low extinction k) so that when the light is focused on the second recording layer 64, it will transmit through recording layer 53 and layer 51,55, 57, 59 with minimal absorption. SiO_2 can be used for these films (6/32-38).

Rosen et al. also teaches a optical recording device shown in figure 3 in which movement of the lens 210 by the focus actuator motor 216 moves the focused spot between the two recording stacks 90,92 on the substrates 50,56 of disk 12 shown in figure 5(5/3-4). Also a disk drive controller 314, is connected to and provides overall control for the various drive functions. Controller 314 adjusts the clock speed of the clock 242 as appropriate depending upon the radial position of the head 22 relative to the disk12. The clock drive 242 generates timing signals with a characteristic clock cycle time T_c, and controls the timing of data reading and writing in the disk drive. The spindle motor 16 is controlled to spin at a constant angular velocity and the linear velocity of the light beam relative to the disk 12 will vary depending on the radial position of the optical head 22(4/33-39).

Shintani et al. US 2003/0039200 teaches the use of a non-linear optical material in a multilayered optical recording medium. A non-linear optical material is a substance whose optical properties change depending on the energy density of the applied light. The following materials may be used as a non-linear optical material for forming a non-linear optical layer: a.) thermochromic materials, b.) transition metal oxide showing semi-conductor metal transition, c.) garnet, and d.) magnetic semi-conductor. The effect of using a non-linear optical layer in a dual or multi-layered recording medium is shown in figure 1 of this application. When the light of the high power density does not irradiate a nonlinear optical layer **104**, i.e. when there is not incident light, and when recording and reading the **L1** reflectance of the non linear optical layer **104** is low while transmittance is high. On the other hand, when recording/reading the **LO** a portion **110** irradiated with light becomes metallic thereby increasing reflectance(0025). In summary, transmittance is high when no focused light is applied whereas it becomes low when the focused light is applied(0031).

In embodiment 1 of US 2003/0039200, Shintani et al. teaches the use of a multilayered structure of VO_2 and GaN as the non-linear optical layer **104** of figure 1. A laminated structure of LO is polycarbonate substrate of 120mm in diameter, a protective layer, a recording film InSe, a protective layer, GaN(2nm), VO_2(2nm), GaN(2nm), VO_2(2nm). A laminate structure of L1 is a protective layer, a recording film InSe, a protective layer, a reflective film, and a polycarbonate substrate. All films are formed by sputtering(0038). FIGS. 3A to 3G show the production process of thee disk in sequence(0039). Before

evaluating the dual-layered medium described above, single layer disks having structure L0 and L1 are formed, respectively for evaluation. The reflectance and transmittance of the L0 layer are measured by a spectrophotometer to find that the reflectance and transmittance of crystal and amorphous thereof, i.e. R_c, R_a, T_c, and T_a are (Rc0,Ra0,Tc0,Ta0)=(5%, 5.5%, 71%, and 62%), correspondingly, and for the L1, (Rc1,Ra1)=(20.3% and 6.2%). For the evaluation of the dual-layered medium, the L0 layer is focused first. The reflectance calculated from an amount of reflecting light obtained at the drive i.e. the drive reflectance is (R_c, R_a)=(10.7%, 3%) respectively. The result is different from the value obtained by a spectrophotometer as described above because the refractive indices of VO_2 and GaN have changed due to the semi-conductor metal transition. Next, the laser is focused on the L1 layer. The reflectance of the L1 is (R1c, R1a)=(10.1%, 3%). The transmittance of the L0 is 70% when in crystal is about a half of the reflectance of the L1 single layer observed by the spectrophotometer

Shintani et al. 2003/0039200 also teaches an optical recording/reproducing device, like that shown in figure 4 of this application, which is used to record/read optical disk like that taught above. The optical recording/reproducing device uses a knife-edge method for auto-focus, and a push-pull method for tracking. Alternatively, an astigmatic method may be used for focus, and a 3-beam differential push-pull method may be used for tracking(0043).

The examiner notes that the applicants use of a “variable refractive index film” on the side of the recording layer opposite the light incidence plane in each

recording stack of the optical recording medium is different from the reference which shows the use of a non-linear optical film, on the side of the recording layer opposite the plane of light incidence, in each recording stack except the final one (counting up from the light incident plane). The benefit of placing a metallic reflective film, or in the case of this application a dielectric reflective film , is that the intensity of the reflected beam is twice that of the initial beam resulting in greater sensitivity of the medium.

The power for reading (P_R) is much less than either the erasing power (P_e) or the writing power (P_w). When reading, the reflection transition at the non-linear optical layer occurs for a small portion of the beam. P_R is not great enough to cause a phase change but the readout is reflective and the reflected beam is smaller than the incident beam. The result is super resolution benefit of readout.

Sakaue et al. '451 teaches an optical disk, shown in figure one, comprising a dielectric layer, a phase-change type recording layer and a reflection layer formed on disk substrate 11 made of a transparent resin by an ordinary method of forming a thin film such as sputtering. A first dielectric layer 12, a second dielectric layer 13, a phase change type recording layer 14, a third dielectric layer 15, a fourth dielectric layer 16, and a reflection layer 17. For the dielectric layers 12 and 16 compounds such as SiO_2, SiO, TiO_2, MgO, Ta_2O_5, Al_2O_3, GeO_2, SiC, ZnS, $ZnSe$, $ZnTe$, PbS, those mainly consisting of nitride such as Ge_3N_4, Si_3N_4, SbN, BN, and AlN or mixtures thereof can be used. In the present embodiment $(ZnS)_{80}(SiO_2)_{20}$ is used. The dielectric layers 13 and 15 should contain at least one selected from the group consisting of Ge and Si and

N as main components thereof. For the reflection layer 17 a metal material mainly consisting of Au, Al, Cu, Cr, Ni, Ti, etc., or a mixture thereof is preferably used, and a dielectric multi-layer film with a large reflectivity at a predetermined wavelength may also be used (4/22-5/16).

It would have been obvious to modify the optical recording medium of Hara et al. JP-03-091128 by adding another recording layer as taught by the example of Rosen et al. EP 0 810 590 to increase (double) the recording capacity and to use a dielectric multilayer rather than a reflective layer in the double recording layer medium resulting from the combination with a reasonable expectation of success based upon Sakaue et al., and to place a non-linear optical film behind each recording layer as taught by Shintani et al. to decrease the spot size of the laser and to increase the resolution of the medium.

The examiner notes that a thickness of .25λ is a known anti-reflection condition.

Further the examiner holds that the limitations of independent claims 16 and 20,which specify a difference in reflection of .8% or more, are met.

9. Claims 1-3, 5-7, 11-14, 16-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al JP 03-091128 in view of Rosen et al EP 0 810 590, Shintani et al 2003/0039200, Sakaue et al. '451, and further in view of Kamiya et al. '690.

Kamiya et al. '690 teaches a tilt servo circuit for an optical disc playback device. Figure 1 is a block diagram showing an embodiment of the tilt servo

circuit with respect to this invention. A disc 10 is mounted on a turntable 13 and which is driven and rotated by a disc motor 11. Laser beam 14 emitted by an optical pickup 12 is irradiated on the record surface of the disc 10 and the reflected laser beam is received by the light-receiving element in the optical pick up 12. Focus servo and tracking servo of the optical pickup 12 are made in accordance with a received beam signal. The received beam signal is supplied as an RF reproduced signal to signal processing system through an RF amplifier 40 an is subjected to signal processing(3/58-4/2). A tilt drive signal is produced for a predetermined period of time in accordance with such determinations to drive the tilt motor 50 thereby tilt-controls the optical pickup 12(6/8-11). Tilt control devices solve the problem of inclination of the laser beam with respect to the perpendicular direction to the disc surface which occurs when there is warp in the disc and also when there is an inclination in the turntable or when the is an optical axis angle error during the manufacture of an optical pickup(1/55-63).

To address the embodiments not rendered obvious above, it would have been obvious to use the media rendered obvious by the combination of Hara et al. with Rosen et al., Shintani, and Sakaue et al. by using a record replay apparatus with servo control and tilt angle control and a composition such as that taught by Kamiya to solve the problem of inclination of the laser beam with respect to the perpendicular direction to the disc surface which occurs when there is warp in the disc and also when there is an inclination in the turntable or when the is an optical axis angle error during the manufacture of an optical pickup as described by Kamiya et al. at (1/55-63).

10. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. 2004/0085882 in view of Rosen et al. EP 0 810 590.

Yamamoto et al. 2004/0085882 teaches a single layer optical recording Medium, as shown in figure 20, in which only one film whose refractive index is changed by the radiated laser is formed in the plurality of laminated dielectric layers. In figure 20 an optical recording medium comprising a substrate 1, a reflective layer, a protective layer3 a recording layer 4, a light condensing layer 208 whose refractive index change is varied by irradiating with the laser beam. The light-condensing layer is located between two combinations of laminated layers, each is composed of repetitive pairs of dielectric layers 207 and 208. Numeral 8 denotes a cover layer. In this embodiment, for controlling reflectance of a blue laser beam of wavelength 405 nm, a film of SiO_2 whose refractive index is 1.47 was formed as the dielectric layer 206, The film had a thickness of 69nm. As the dielectric film 207 was formed a film of $80ZnS\text{-}20SiO_2$ whose refractive index is 2.3. The film had a thickness of 44nm. The ratio of n_{206}/n_{207} is .63. The product $n_{206}d$ is .25λ. The product of $n_{207}d$ is .25λ. The other layers such as the reflective layer, the recording layer, and the protective layer are the same as in embodiment one found at (0045). In figure 20 the plurality of laminated layers 205 are composed of three cycles of combination of the dielectric layers 206 and 207. In actual, as varying the number of laminating cycles of the plurality of laminated layers in the range of 5-30 cycles, the change in characteristics was studied. Figure 22 shows the change in reflectance against laser beam intensity.

Layer 208 is functions as a non-linear optical layer and results makes it possible to obtain an optical recording medium of high recording density and high S/N ratio (0104-0117).

Yamamoto et al also discusses the reasoning for combining a light-condensing layer with an interference layer. Light –condensing materials or photochromic materials raises its extinction coefficient by the heat or excitation caused by beam radiation, so that the layer composed of such material may lower its transmittance or reflectance. The resulting laser may not reach the required power for reading information from the medium. In order to overcome this problem an interference layer is laminated on the beam incident side of a super resolution reproducing film(composed of a light condensing material) whose extinction coefficient is selectively made higher by the greater beam radiation than the predetermined threshold volume. The interference layer is composed of a low refractive index layer and a layer of high refractive index. The interference layer serves to increase the reflectance of the beam radiated onto the optical recording medium(0009).

It would have been obvious to one skilled in the art to modify Yamamoto et al. by adding more recording stacks, as taught by Rosen et al., to increase the recording capacity.

11. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al 2004/0085882 with Rosen et al. EP 0 810 590 in view of Tseng et al. 2004/0219455.

Tseng et al. 2004/0219455 teaches the use of a near-field electromagnetic wave enhancement layer 30 shown in figure 2. The near-field electromagnetic wave enhancement layer uses composite material by adding metal particles 32 into dielectric materials 31. The dielectric materials 31 can be silica (SiO_2), titanium oxide (TiO_2), tantalum oxide (TaO_x), zinc sulfide, silicon nitride (SiN_x), aluminum nitride (AlN_x), silicon carbide (SiC), silicon (Si) or mixtures thereof. The metal particles 32 can be gold, silver, copper, aluminum, platinum, palladium, chromium, tungsten, or the metal particles of the alloys of any of these metals. The diameter of these metal particles and the distance between each particle influences the strength of the resonance effect between the near-field electromagnetic wave enhancement layer and the recording layer 50. The near-field enhancement layer has a thickness ranging from 1nm to 80nm(0037-0038).

To address the embodiments not rendered obvious above, it would have been obvious to modify the combination of Yamamoto and Rosen discussed above by using the super-resolution films such as the metal particles in dielectrics disclosed by Tseng et al with a reasonable expectation of producing a medium with each recording stack able to be read/recorded upon with high resolution.

12. Claims 1-7 and 11-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. 2004/0085882 with Rosen EP 0 810 590 and Tseng et al. 2004/0219455, in view of Kamiya et al. '690.

To address the embodiments not rendered obvious above it would have been obvious to use the media rendered obvious by the combination of Yamamoto et al, Rosen and Tseng in a recording apparatus taught by Kamiya et al to solve the problem of inclination of the laser beam with respect to the perpendicular direction to the disc surface which occurs when there is warp in the disc and also when there is an inclination in the turntable or when the is an optical axis angle error during the manufacture of an optical pickup as described by Kamiya et al. at (1/55-63).

Allowable Subject Matter

13. Claims 8 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The spacer layer of this application is made of an amorphous rather than a polymeric material and is thinner than those of the prior art.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,896,946- Chen et al. '946 teaches an initiation free super resolution medium which includes in sequence: a substrate; a first dielectric layer on the first substrate; an active layer on the first dielectric layer; a second dielectric layer on the active layer; an initiation-free recording layer on the second dielectric layer; and a third dielectric layer on the initiation free-recording layer (2/31-37). The initiation-free super-resolution optical recording medium can further include a reflective layer formed on the third dielectric layer and a UV resin protective layer formed on the reflective layer(2/50-54). The first and second and third dielectric layers can have thicknesses of 10-200nm, 1-100 nm, and 2-80nm respectively and can be made of Silicon nitride, ZnS-SiO_2, aluminum nitride, SiC, germanium nitride, titanium nitride, tantalum oxide, aluminum oxide, or yttrium oxide. The active layer can have a thickness of 1 nm to 100 nm and can be made of silver oxide, **vanadium oxide, zinc oxide**, gallium oxide, germanium oxide, arsenic oxide, selenium oxide, indium oxide, tellurium oxide, antimony oxide, or platinum oxide. The initiation free recording layer can have a thickness of 1-60nm and can be made of Ge, Te, Sb, In, Ag, or mixtures thereof. In addition the initiation-free recording layer can be made of Ge, Te, Sb, In, Ag, or mixtures thereof further doped with a doping metal of Se, Zn, Mo, Sn, Bi, V or mixtures thereof(2/55-3/8)

Chen et al. '946 a conventional super-resolution near-field structure("super RENS") using silver oxide (AgO). Across-section of this structure is shown in figure one of this application. The super-resolution optical medium includes, in sequence, a pre-grooved polycarbonate substrate 10, A ZnS-SiO_2 dielectric layer 12 with a thickness of about 130nm, a AgO active layer 14 with a thickness of about 15 nm, a ZnS-SiO_2 dielectric layer 16 with a thickness of about 40 nm, an amorphous $Ge_2Sb_2Te_5$ alloy recording layer 18 with a thickness of about 20 nm, and a ZnS-SiO_2 dielectric layer 20 with a thickness of about 20nm. When reading, the active layer 14 can absorb the laser beam to form near-field optical effect and generate surface plasma, that is, form a super-resolution structure.

US 7,041,430 -Miyamoto et al. '430 fabricates, in example two of this application, a laminate structure illustrated in Fig. 14. On substrate 1 disposed on the light-incidence side of a recording layer, 124 nm of $(ZnS)_{80}(SiO_2)_{20}$ as a first interference layer 10, 3nm of Cr_2O_3 as a first interface layer 12, 8nm of $Ge_{28}Sb_{18}Te_{54}$ as a recording layer 4, 32 nm of $(SnO_2)_{80}(ZnS)_{20}$ as a protective layer 13, 33 nm of $Cr_{90}(Cr_2O_3)_{10}$ as an absorption compensation layer 7, and 50 nm $Al_{99}Ti_1$ as a heat sink layer 8 are successively laminated by sputtering, and thereon is provided an ultraviolet-curable resin 14. Two sheets of the information-recording medium prepared in the above-mentioned manner are bonded together by the use of an adhesive so that the ultraviolet curable resin sides face each other, and then the whole area is initialized with an apparatus for initializing the recording layer(11/39-53). Chen et al. '946 also has other examples where he uses $Cr_{90}(Cr_2O_3)_{10}$ as an absorption compensation layer.

The absorption compensation layer is preferably made of a material of which complex index of refraction n, k satisfies $1.4<n<4.5$ and $-3.5<k<-0.5$ and particularly $2<n<4$ and $-3.0<k<-0.5$. Since the absorption compensation layer absorbs light, this layer is preferably constituted of thermally stable material and it is required that the melting point thereof is $1{,}000^0$ C or higher. The metal is preferably chosen from Al, Cu, Ag, Au, Pt, Pd, Co, Ti, Cr, Ni, Mg, Si, V, Ca, Fe, Zn, Zr, Nb, Mo, Rh, Sn, Sb, Te, Ta, W, Ir, and Pb mixture. As said metal oxide metal sulfide, , metal nitride and metal carbide SiO_2, SiO, TiO_2, Al_2O_3, Y_2O_3, CeO, La_2O_3, In_2O_3 , GeO, GeO_2, PbO, SnO, SnO_2, Bi_2O_3, TeO_2, MO_2, WO_2, WO_3, Sc_2O_3, Ta_2O_5, and ZrO_2 are particularly preferable. Apart from the above, it is also possible to use an absorption compensation layer using oxides including Si-O-N type material, Si-Al-O-N type material, Cr-O type material such as Cr_2O_3, CoO and the like; Nitrides including Si-N type material (for example $AlSiN_2$), Ge-N type material and the like;Sulfides such as ZnS, Sb_2S_3, CdS, In_2S_3, Ga_2S_3, GeS, SnS_2, PbS, Bi_2S_3, and the like or a material having a composition close to the above-mentioned ones(19/65-20/41).

US-5,470,628- Teaches a mask layer which may contain Ag, Au,Mn, or V(10/33-40) and also SiO_2, Si_3N_4, ZnS, or mixtures thereof(11/7-25).

US 7,063,876- Transmittance adjustment film-specifications for thickness and for materials that it may be made of(16/6-17/16).

US 2005/0207322- multi-layer dielectric reflective layer(0012-0013).

Yoshinari et al. teaches a multilayer optical recording medium, shown in figure 1., having a phase-change recording layer 4 surrounded on each side by dielectric layers 31. The dielectric layer 31 is preferably formed as a laminate of two or more layers each having different refractive indices. Such a multi-layer structure also results in an increased flexibility of optical design, and an increase in the light transmittance of the entire data layer can be realized. An exemplary dielectric multi-layer structure is a laminate of at least one selected from magnesium fluoride layer, manganese fluoride layer, germanium nitride oxide layer, and silicon oxide layer, with a ZnS-SiO_2 layer(0067).

US 4,905,215- Figure 1 shows a two layer magneto-optical recording medium containing a intermediated non-magnetic layer 16. The non-magnetic layer 16 is formed of a non-magnetic material, such as AlN, SiO, SiO_2, Si, or a radiation-curable resin. The examiner notes that typical intermediate layers are made from polymeric materials and are thicker than that specified in this application.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna L. Verderame whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8:30A-5:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax

phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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